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10/599,279	09/25/2006	Ehud Dafni	298856-00004	6445

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EXAMINER

YUN, JURIE

ART UNIT	PAPER NUMBER
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2882

NOTIFICATION DATE	DELIVERY MODE
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06/30/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ipmail@eckertseamans.com

Office Action Summary	Application No. 10/599,279	Applicant(s) DAFNI, EHUD	
	Examiner JURIE YUN	Art Unit 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The amendment filed 6/17/08 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1-29 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 1 is objected to because of the following informalities:
 - in line 5, there is lack of antecedence for "said X-ray beam"
 - in line 9, there is lack of antecedence for "said plurality of detection elements"
 - - in lines 12-13, there is lack of antecedence for "said plurality of detection elements"
 - in lines 25-26, there is lack of antecedence for "the blood vessels" and "the surrounding tissues"
 - Appropriate correction is required.
4. Claim 14 is objected to because of the following informalities: in line 2, there is lack of antecedence for "said low energy photons presentation and said high energy photons presentation". Appropriate correction is required.
5. Claim 20 is objected to because of the following informalities:
 - in line 6, there is lack of antecedence for "said plurality of detection elements"
 - in line 10, there is lack of antecedence for "said plurality of detection elements"

Appropriate correction is required.

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6. Claim 24 is objected to because of the following informalities: in lines 1-2, there is lack of antecedence for "said detecting means". Appropriate correction is required.

7. Claim 26 is objected to because of the following informalities: in line 6, after "high energy image from" it appears that perhaps --said another image attained from-- should be inserted. Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 18, 19, 25, and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The wording of the claims is awkward and it is not known with certainty what exactly is being claimed. Specifically, "to another electronic representation..." is confusing. Normalizing a high energy image to another electronic representation? What does this mean?

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-4 and 7-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keyes et al. (USPN 4,393,402) in view of Han et al. (USPN 6,408,050 B1).

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12. With respect to claims 1 and 20, Keyes et al. disclose an apparatus for improved dynamic angiographic X ray imaging of a subject's body infused with contrast agent, said apparatus comprising: an x ray source (12) capable of emitting X rays directed to pass through the subject's body (10); a sensor system (17) capable of receiving attenuated X rays that passed through the subject's body; an acquisition system capable of receiving data from said sensor and generate at least two electronic representations wherein one of said at least two electronic representations is attained from low energy photons and another one of said at least two electronic representations is attained from high energy photons wherein said at least two electronic representations are measured at a certain position of said X ray source; a processor capable of manipulating said at least two electronic representations into at least one image; and a display adapted to display said at least one image, whereby said at least one image attained from at least two energy bins amplify the appearance of the contrast agent in the blood vessels in respect with the surrounding tissues of the subject's body (column 2, lines 19+).

Keyes et al. disclose all of the elements except for wherein said X ray beam is polychromatic; wherein said sensor comprises: a detector divided into a plurality of detector elements, wherein each one of said plurality of detection elements is adapted to convert photon energy of a portion of said attenuated X rays into electric charges; and at least one readout chip divided into a plurality of channels wherein each one of said plurality of channels is electronically connected to one of said plurality of detection elements and wherein each one of said plurality of channels is adapted to convert said

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electric charges into digital data; the at least one readout chip provided with at least two discriminators; setting threshold levels for said at least two discriminators for each one of said plurality of channels at least once; and wherein said at least two electronic representations are measured simultaneously at the subject.

Han et al. disclose this (column 2, lines 1-35 & column 2, lines 59+ & column 3, lines 33-43 & 53-65 & column 4, lines 35-39 & column 5, lines 45-55) for improving image quality which can be compromised due to patient movement and to reduce patient exposure. Keyes et al. are also concerned with improving image quality which can be compromised due to patient movement (column 1, lines 45+).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Keyes et al. to have the X ray beam be polychromatic; wherein said sensor comprises: a detector divided into a plurality of detector elements, wherein each one of said plurality of detection elements is adapted to convert photon energy of a portion of said attenuated X rays into electric charges; and at least one readout chip divided into a plurality of channels wherein each one of said plurality of channels is electronically connected to one of said plurality of detection elements and wherein each one of said plurality of channels is adapted to convert said electric charges into digital data; the at least one readout chip provided with at least two discriminators; setting threshold levels for said at least two discriminators for each one of said plurality of channels at least once; and wherein said at least two electronic representations are measured simultaneously at the subject, to improve image quality and reduce patient X-ray exposure, as taught by Han et al.

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13. With respect to claims 2 and 3, Han et al. disclose wherein said detector is a pixel detector chip made of a semiconductor material; wherein said semiconductor material is Cadmium Zinc Telluride (CZT) (column 2, lines 53-67).

14. With respect to claim 4, Han et al. disclose wherein said detector is a detector chip made of a scintillator material coupled to light to charge conversion elements (column 2, line 67).

15. With respect to claims 7-9, Han et al. disclose said at least one readout chip is provided with at least two programmable threshold discriminators so as to allow each one of said plurality of channels to output a representation of a number of photons carrying energy below a predetermined threshold, between said predetermined threshold and a higher predetermined threshold, and above said higher predetermined threshold; wherein said at least one readout chip is provided with a preamplifier and a pulse shaper; and further comprising at least two counters adapted to count events detected in the at least two programmable threshold discriminators (column 3, lines 5+).

16. With respect to claim 10, Keyes et al. disclose the infused contrast agent is Iodine solution (column 1, line 39).

17. With respect to claims 11, 12, 21, and 22, Han et al. disclose said low energy photons are set below the K edge of the contrast agent and said high energy photons are set above the K edge of the contrast agent; said low energy photons are set just above the K edge of the contrast agent and said high energy photons are set further above the K edge of the contrast agent (column 5, lines 56-65).

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18. With respect to claims 13 and 27, Keyes et al. disclose a portion of the subject's body is the chest and wherein coronary blood vessels are imaged (column 2, lines 19+).

19. With respect to claim 14, Keyes et al. disclose a difference image of said low energy photons presentation and said high energy photons presentation is generated and displayed so as to amplify the appearance of the contrast agent, wherein said difference image is motion artifacts prone (Keyes et al. - column 1, lines 39+ & column 2, lines 19+).

20. With respect to claims 15 and 28, Keyes et al./Han et al. do not specifically disclose a portion of the subject's body is the head and neck and wherein cranial or cranial supply blood vessels are imaged. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the apparatus of Keyes et al./Han et al. to image cranial or cranial supply blood vessels, because these are typically imaged in a dual-energy imaging mode.

21. With respect to claims 16 and 29, Keyes et al./Han et al. do not specifically disclose peripheral blood vessels are imaged. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the apparatus of Keyes et al./Han et al. to image peripheral blood vessels, because these are typically imaged in a dual-energy imaging mode.

22. With respect to claim 17, Keyes et al. disclose images are acquired, processed and displayed multiple times every second at a short time lag from acquisition so as to generate real time imaging of the subject's body (column 2, lines 19+).

It is noted that while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function alone. See MPEP 2114.

In this case, it should be recognized that the wherein clause is functional in nature and does not distinguish structurally the instant claim over the prior art. See MPEP 2114 and 2111.04.

23. With respect to claims 18, 19, 25, and 26, Han et al. disclose said processor is adapted to process said at least two electronic representations by producing a normalized high energy image of one of the electronic representation attained from high energy photons to another electronic representation attained from low energy photons and subtraction of said normalized high energy image from said another electronic representation; said processor is adapted to process said at least two electronic representations by producing a normalized high energy image of one of the electronic representation attained from high energy photons to another electronic representation attained from low energy photons and subtraction of a pre-determined fraction of the normalized high energy image from said another electronic representation (column 4, lines 35+). This rejection is made to the extent the claim is understood.

24. With respect to claim 23, Keyes et al./Han et al. do not specifically disclose setting threshold levels comprises irradiating said detecting means with radiation of at least two predetermined energy levels while monitoring output counting rate so as to set the threshold level slightly below the level in which the count rate drops. However, it would have been obvious to one of ordinary skill in the art at the time the invention was

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made that Keyes et al./Han et al. do this, because this is necessary in setting threshold levels.

25. With respect to claim 24, Keyes et al./Han et al. do not disclose said detecting means is irradiated with X ray photons at 32 keV for setting one threshold level and with gamma rays of 59.5 keV for setting a second threshold level. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Keyes et al./Han et al. to do this, depending on the application being done.

26. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keyes et al. (USPN 4,393,402) in view of Han et al. (USPN 6,408,050 B1) as applied to claims 1 and 4 above, and further in view of Homma et al. (US 2005/0017189 A1).

27. With respect to claims 5 and 6, Keyes et al./Han et al. do not specifically disclose wherein said scintillator material is CsI(Na) or CsI(Tl); wherein said light to charge conversion elements comprise an array of Si photodiodes. Homma et al. disclose wherein said scintillator material is CsI(Na) or CsI(Tl) (paragraph 0079); wherein said light to charge conversion elements comprise an array of Si photodiodes (paragraph 0105). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the scintillator material is CsI(Na) or CsI(Tl); wherein said light to charge conversion elements comprise an array of Si photodiodes, because these are known to be effective for detecting x-rays, as taught by Homma et al.

Conclusion

28. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JURIE YUN whose telephone number is (571)272-2497. The examiner can normally be reached on Monday-Friday 8:30-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on 571 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jurie Yun/
Primary Examiner, Art Unit 2882

June 24, 2009